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NOTES AND LITERATURE

BIOMETRICS

AN INTRODUCTION TO STATISTICAL METHODS

IN spite of the great development of biometric work, and of the application of statistical conceptions and methods in a number of fields of science other than biological, during the last decade there has been produced up to the present time no fully satisfactory introduction to the elementary principles of modern statistical methods. The books which have appeared in this field have been, broadly speaking, either (*a*) too technical and advanced in their treatment, or (*b*) compilations of formulæ with so little in the way of guiding principles as actually to lead any but the already expert into many difficulties, or (*c*) incomplete, incorrect and superficial at vital points, or finally, (*d*) have appealed to a very limited class of readers by developing the subject in direct relation to a narrow field of science only. This need for a comprehensive, elementary and sound introduction to statistical methods is admirably met in a recently published book by Yule.[1]

The subject is treated under three main heads as follows: (I) The Theory of Attributes, (II) The Theory of Variables, (III) The Theory of Sampling. In the first part the author deals with the logical basis of statistical theory, a field which is essential to a proper understanding of the subject, and in which he is, by the extent and character of his original investigations, qualified to speak with unique authority. Successive chapters in this portion of the work deal with Notation and Terminology, Consistence, Association, Partial Association, Manifold Classification.

The second part of the book takes up the discussion of frequency distributions and their physical constants, and the elementary theory of correlation and its applications, ending with an account of multiple and partial correlation. Here we are dealing with matters of immediate practical importance in the application of statistical methods to all kinds of scientific problems. It would be difficult to say too much in commendation of the author's method of treating these subjects. No knowledge of mathematics beyond algebra up to the binomial theorem is presumed, yet the subject is developed in such a simple, lucid and at the same time thorough way as to give the reader a real and adequate grasp not only of the technique of the methods, but also of their origin and significance. Numerical examples drawn from a wide range of materials are given at every stage and worked out in detail. Particular attention is paid to guiding the unwary beginner around the numerous pitfalls which beset the statistical pathway. Chapters are devoted to the methods of arranging data in the form of frequency distributions, determining centering constants (arithmetic, geometric and harmonic means, mode, median, etc.), variation or "dispersion" measuring constants, and coefficients of correlation. The treatment of correlation is particularly comprehensive and practical.

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[1] Yule, G. Udny, ''An Introduction to the Theory of Statistics,'' London (Chas. Griffin & Co.), 1911, pp. xiii + 376.

The last section of the book deals with the general subject of "probable errors." The theory of fluctuations in statistical measures due to random sampling is developed first in relation to the theory of attributes and then in relation to the more complex theory of variables. The discussion of the simple sampling of attributes leads up in a straightforward way through the point binomial to the normal curve of errors, and the normal correlation surface.

Each chapter throughout the book is followed by a short list of selected titles of original papers, and a series of practical problems to be worked out by the student. Appendices give short bibliographies of calculating tables, tables of functions, etc., and general works on the mathematical theory of statistics and the theory of probability. A list of answers and hints in regard to the problems and a full index complete the volume.

Altogether the book is a notable one. Those who are familiar with Yule's paper "On the Theory of Correlation" (published in the *Journal of the Royal Statistical Society* in 1897) which has become one of the classics of biometric literature will be prepared to welcome the present work. It is marked throughout by the same clearness, directness and appreciation of the difficulties of the beginner which distinguished that memoir. For the non-mathematical student desirous of obtaining a sound working knowledge of the elements of modern statistical theory this book will be of the greatest value. In the field which it covers it is without a peer.

RAYMOND PEARL.